
PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Coded-Wire Tag Recovery

BPA project number: 8201300

Contract renewal date (mm/yyyy): 1/2001 ☐ **Multiple actions?**

Business name of agency, institution or organization requesting funding

Pacific States Marine Fisheries Commission

Business acronym (if appropriate) PSMFC

Proposal contact person or principal investigator:

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NPPC Program Measure Number(s) which this project addresses

4.1A, 4.3, 4.3C, 5.0, 5.0E, 5.4C, 7.1A, 7.1C, 7.1D, 7.2A.2, 7.2B, 7.2D, 7.4I, 7.4J, 7.4K, 7.4L, 7.4M, 7.4N, 7.5B.3, 7.5C, 8.2C, 8.2D, 8.2E, 8.4C, 8.4C.2, 8.4C.3, 8.4C.4, 8.4D

FWS/NMFS Biological Opinion Number(s) which this project addresses

ND- NMFS-BO- Basic Monitoring

NMFS Hydrosystem Operations Biological Opinion- VIII.A.13 (Reasonable & Prudent Alternative to the Proposed Action #13)

Other planning document references

Snake River Recovery Plan (2.1.d.5).

Snake River Salmon Recovery Team: Final Recommendations: Chapter III.K: Importance of Stock Identification in Managing Salmon; Chapter IV.7 Evaluation and Monitoring of Population Status and Trends (also subsections 7.c and 7.d).

Wy Kan Ush Me Wa Kush Wit: Review Draft, Volume 1: Section 5A - Recommendations: Research, Monitoring and Evaluation and a Coordinated Information System; Section 5B - Technical Recommendations: #9) Selective Fisheries Habitat: Ocean and Mainstem; #10) Chinook Harvest Ceilings Habitat: Ocean (CWTs essential

for estimating survival rates); #13) Stock-specific Concerns Habitat: Mainstem, Tributaries

Short description

Recovery of CWTs from salmonids sampled in the commercial and sport fisheries (Columbia River and Oregon ocean), spawning grounds and hatcheries. Provides critical stock identification information required to evaluate the status of Columbia Basin stocks.

Target species

Chinook, coho, chum, and sockeye salmon
Steelhead trout

Section 2. Sorting and evaluation

Subbasin

Systemwide

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input checked="" type="checkbox"/> Anadromous fish <input type="checkbox"/> Resident fish <input type="checkbox"/> Wildlife	<input checked="" type="checkbox"/> Multi-year (milestone-based evaluation) <input type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input type="checkbox"/> Information dissemination <input type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input checked="" type="checkbox"/> Research & monitoring <input type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description
20543	Coded-Wire Tag Program (Programatic Umbrella)
8201300	Coded-Wire Tag Recovery Program
8906500	Annual Stock Assessment - CWT (USFWS)
8906600	Annual Stock Assessment - CWT (WDFW)
8906900	Annual Stock Assessment - CWT (ODFW)

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9000500	Umatilla Hatchery Monitoring and Evaluation	Production evaluation; Stock identification in fisheries and escapement
9600800	PATH - Participation by State and Tribal Agencies	CWT data from fisheries and escapement used for stock modeling purposes
9306000	Select Area Fisheries Evaluation	Production evaluation; Stock identification in Youngs Bay, Tongue Point, and Blind Slough fisheries
8805304	Hood River Production Program - Pelton Ladder - Hatchery	Identification of hatchery fish in Hood River Basin
8902900	Hood River Production Program - Monitor Actions	Identification of hatchery fish in Hood River Basin
9603301	Yakima River Fall Chinook Supplementation	CWTs used for stock monitoring and evaluation in Yakima Basin
9603302	Yakima River Coho Restoration	CWTs used for stock monitoring and evaluation in Yakima Basin
833500	Big Canyon Creek Portable Acclimation/Release Facility	CWTs used along with PIT tags and radio tags for stock evaluation
9506300	Yakima/Klickitat Monitoring Evaluation Program	CWTs used for stock monitoring and evaluation in Yakima Basin
9506401	Refinement of Marking Methods for YKFP	CWTs included in marking methods
9604000	Wenatchee/Methow Coho	CWTs used for stock monitoring and evaluation in Wenatchee and Methow Basins
9144	Monitor Natural Escapement & Productivity of John Day Basin Spring Chinook	CWTs used for stock monitoring and evaluation in John Day Basin
	** Listing Incomplete **	

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1998	<p>** ANNUAL ACCOMPLISHMENTS** (Listed only for 1998 but apply all years)</p> <p>*** 1982 to Present ***</p>	<p>Yes. Overall, the minimum 20% sampling level is achieved in most time/area strata. However, it is difficult to sample all times and areas coastwide and in the Columbia R. Declining run sizes of certain</p>

		stocks also necessitate higher sampling levels.
1998	Randomly sampled mainstem Columbia River non-Indian and Treaty Indian commercial fisheries and the recreational fisheries at minimum 20% sampling rate.	Yes
1998	Randomly sampled Willamette and Clackamas River spring chinook sport fisheries plus fall chinook and coho returning to Oregon escapement areas below Bonneville Dam.	Yes
1998	Randomly sampled all major Washington tributary recreational fisheries plus spring/fall chinook and coho returning to escapement areas below McNary Dam.	Yes
1998	Randomly sampled fall chinook recreational fisheries and returns to the spawning grounds on the Hanford Reach on the upper Columbia River.	Yes
1998	Estimated total catch and effort in the mainstem Columbia River commercial and recreational fisheries (including Buoy 10), and in the spring chinook fisheries in the Willamette and Clackamas Rivers.	Yes
1998	Estimated spawning populations for Oregon's lower Columbia River tributaries, all major Washington tributaries, and fall chinook returning to Hanford Reach.	Yes
1998	Estimated returns to Oregon's lower Columbia River fall chinook hatcheries.	Yes
1998	Estimated stock composition of summer steelhead and brights/tule fall chinook at Bonneville Dam.	Yes
1998	Estimated catch and effort in all major Washington tributary recreational fisheries and in the fall chinook recreational fishery on Hanford reach.	Yes
1998	Determined age composition for all Columbia River basin recreational and commercial fisheries (including Washington tributary fisheries) for spring and fall chinook.	Yes
1998	Determined stock composition of Columbia River mainstem and	Yes

	Washington terminal area fisheries and hatchery/wild ratios of summer steelhead at Bonneville Dam.	
1998	Produced run reconstruction and pre-season run size forecasts for all major salmonid stocks and ESA substocks.	Yes
1998	Sampled Oregon's ocean commercial troll and sport salmon fisheries at a minimum of 20% of the weekly landed catch within major ocean sampling catch areas.	Yes
1998	Estimated total commercial troll and sport salmon harvest by species in Oregon's ocean fisheries.	Yes
1998	Ocean and Col R. CWT recovery data merged with catch/sample data to determine survival, distribution, harvest rates, contribution and status of wild, natural and hatchery salmon and steelhead stocks. Data reported to PSMFC's RMIS system and other users.	Yes
1998	Wide variety of reports produced, including annual status reports summarizing fish runs, population status, fisheries and escapements.	Yes
1998	Timely processing of sampled snouts by ODFW's Clackamas lab for extraction and decoding of CWTs.	Yes
1998	Regional access to all CWT data (release, recovery, and catch/sample records) provided through PSMFC's on-line 'Regional Mark Information System'.	Yes
1998	***See the listing of objectives and tasks below for numerous other project accomplishments not listed above.	Yes

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
	Columbia Basin CWT Sampling:		

	Joint ODFW/WDFW Program (Objectives 1-3)		
1	Snout Recovery: Recover snouts from CWT marked salmon and steelhead landed in Columbia River sport and commercial fisheries and returning to escapement areas.	a	Randomly sample mainstem Columbia River non-Indian and Treaty Indian commercial fisheries and the recreational fisheries at a minimum 20% sampling rate.
		b	Randomly sample Willamette and Clackamas River spring chinook sport fisheries plus fall chinook and coho returning to Oregon escapement areas below Bonneville Dam (ODFW task).
		c	Randomly sample all major Washington tributary recreational fisheries plus spring/fall chinook and coho returning to escapement areas below McNary Dam (WDFW).
		d	Randomly sample fall chinook recreational fisheries and returns to the spawning grounds on the Hanford Reach on the upper Columbia River.
2	Creel Census and Escapement Area Programs: Estimate total harvest in commercial fisheries, total effort and catch in the recreational fisheries, document hatchery returns, and estimate spawning populations.	a	Estimate total harvest in mainstem Columbia River commercial fisheries
		b	Estimate total catch and effort in the mainstem Columbia River recreational fisheries (including Buoy 10), and in the spring chinook fisheries in the Willamette and Clackamas Rivers.
		c	Estimate spawning populations for Oregon's lower Columbia River tributaries, all major Washington tributaries, and fall chinook returning to Hanford Reach.
		d	Estimate returns to Oregon's lower Columbia River fall chinook hatcheries.
		e	Estimate stock composition of

			summer steelhead and brights/tule fall chinook at Bonneville Dam.
		f	Estimate catch and effort in all major Washington tributary recreational fisheries and in the fall chinook recreational fishery on the Hanford reach.
3	Data Analysis and Delivery: Combine CWT recovery data with catch/sample data and determine survival, distribution, harvest rates, contribution and status of wild, natural and hatchery salmon and steelhead stocks. Report data to PSMFC's RMIS system.	a	Combine error checked CWT recovery data with associated catch/sample data on ODFW's mainframe computer. (Includes WDFW's Columbia River mainstem recoveries plus some escapement and catch data from other resource agencies)
		b	Determine age composition for all Columbia River basin recreational and commercial fisheries (including Washington tributary fisheries) for spring and fall chinook.
		c	Determine age composition of chinook in Oregon and Washington tributary escapement areas and of summer steelhead at Bonneville Dam.
		d	Determine Washington and Oregon terminal area tag rates for spring and fall chinook by stock.
		e	Determine stock composition of Columbia River mainstem and Washington terminal area fisheries and hatchery/wild ratios of summer steelhead at Bonneville Dam.
		f	Produce run reconstruction and pre-season run size forecasts for all major salmonid stocks and ESA substocks.
		g	Provide data to major projects funded by BPA, including StreamNet, PATH, and Columbia River Salmon Passage Model (CRiSP1).
		h	Provide stock status data for use by state, federal, and international fishery management agencies to set

			and make adjustments to the ocean and Columbia River fisheries.
		i	Provide survival data necessary to evaluate hatchery practices.
		j	Transfer merged and verified recovery CWT data and associated catch/sample data to PSMFC for incorporation into the regional database (Regional Mark Information Sytem (RMIS)).
		k	Produce annual status reports summarizing fish runs, population status, fisheries and escapements.
	Ocean CWT Sampling: ODFW Program (Objectives 4-6)		
4	Recovery of CWTs from chinook and coho salmon landed in Oregon's ocean commercial troll and recreational fisheries.	a	Sample Oregon's ocean commercial troll salmon fishery at a minimum of 20% of the weekly landed catch within major ocean sampling catch areas.
		b	Sample Oregon's recreational salmon fishery at a minimum of 20% of the weekly landed catch within major ocean sampling catch areas.
5	Determine total commercial troll and recreational landings and effort by time and catch area from expansions of sampled data.	a	Estimate total commercial troll salmon harvest by species in Oregon's ocean fisheries.
		b	Estimate total recreational salmon harvest (private vessels and charter boat) in Oregon's ocean fisheries.
6	Data Analysis and Delivery: Combine CWT recovery data with catch/sample data and determine survival, distribution, harvest rates, contribution and status of Columbia River wild, natural and hatchery salmon and steelhead stocks. Report data to PSMFC.	a	Upload ocean port salmon sampling data onto ODFW mainframe computer. Complete second level error checks and process CWT and sampling data for delivery to PSMFC's regional database.
		b	Provide stratified time/area data analysis on CWT ocean fishery recoveries, fishery effort and landings to ODFW fishery managers, PFMC, PST, CBFWA,

			NMFS, ESA stock status reviews, and others as requested.
		c	Produce "Oregon Ocean Salmon Fisheries Annual Report". Contribute to the PFMC annual report on ocean fisheries.
	Clackamas CWT Tag Recovery Lab: ODFW (Objectives 7-8)		
7	Process Fish Heads Containing Coded Wire Tags.	a	Retrieve fish heads from various collection locations several times a year to provide timely processing and decoding of the CWTs.
		b	Extract and decode CWTs from fish heads.
8	Data Delivery: Verify and report decoded CWTs to ODFW's data management operations and to PSMFC's RMIS system.	a	Enter and verify CWT decoding data on the ODFW mainframe database. (Includes WDFW's Columbia River mainstem tag recoveries).
		b	Transfer CWT data to PSMFC.
		c	Return recovered tags of non-Oregon origin to the appropriate release agencies. Maintain an archival tag recovery collection for all tags released by Oregon hatcheries and other wild stock tagging programs.
	PSMFC Regional Mark Processing Center: (Objectives 9-10)		
9	Provide regional CWT data management	a	Maintain and upgrade the regional database for all CWT releases and recoveries, including release and recovery data from ODFW, WDFW and USFWS.
		b	Produce and distribute annual report on regional CWT releases (Pacific Salmonid Coded-Wire Tag Releases: 199- to 199-).
		c	Maintain and upgrade PSMFC's on-line "Regional Mark Information System" (RMIS), to facilitate on-line user retrieval of regional CWT release, recovery, and catch/sample data.
10	Provide regional coordination of marking programs.	a	Serve on regional committees that involve coordination of marking and

			coded wire tags. This includes PSC's Data Sharing, Data Standards and Catch/Effort committees and chairing the Regional Mark Committee.
		b	Assist in the resolution of political issues in marking salmonids, including mass marking of hatchery stocks and the impact on the integrity of the coastwide CWT program.

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	1/1999	12/1999	ODFW/WDFW Col. River Sampling: Recover snouts from CWT marked salmon and steelhead landed in Columbia River sport and commercial fisheries and returning to escapement areas.	Randomly sample Col. R. fisheries at minimum 20% level. Estimate stock composition in fisheries and escapement; Estimate catch and effort.	41.00%
2	1/1999	12/1999	ODFW/WDFW Col. River Sampling: Creel Census and Escapement Area Programs: Estimate total harvest in commercial fisheries, total effort and catch in the recreational fisheries, document hatchery returns, and estimate spawning populations.	Estimate stock composition in sampled fisheries and escapement; Estimate catch and effort.	14.00%
3	1/1999	12/1999	ODFW/WDFW Col. R. Sampling: Combine CWT recovery data with catch/sample data and carry out data analyses.	Determine run reconstruction and run size predictions, survival,	16.00%

			Report data to PSMFC's RMIS system.	distribution, harvest rates, contribution and status of wild, natural and hatchery salmon and steelhead stocks. Report data to PSMFC's RMIS system.	
4	1/1999	12/1999	ODFW Ocean Sampling: Recovery of CWTs from chinook and coho salmon landed in Oregon's ocean commercial troll and recreational fisheries.	Randomly sample ocean fisheries at minimum 20% level. Estimate stock composition in fisheries;	9.00%
5	1/1999	12/1999	ODFW Ocean Sampling: Determine total commercial troll and recreational landings and effort by time and catch area from expansions of sampled data.	Estimate catch and effort in ocean commercial and sport fisheries	2.00%
6	1/1999	12/1999	ODFW Ocean Sampling: Combine CWT recovery data with catch/sample data and carry out data analyses. Report data to PSMFC.	Determine run reconstruction and run size predictions, survival, distribution, harvest rates, contribution and status of Columbia River wild, natural and hatchery salmon and steelhead stocks. Report data to PSMFC.	4.00%
7	1/1999	12/1999	ODFW Head Lab: Process Fish Heads Containing Coded Wire Tags.	Recover and decode CWTs	6.00%
8	1/1999	12/1999	ODFW Head Lab: Data	Timely process	4.00%

			Delivery; Verify and report decoded CWTs to ODFW's data management operations and to PSMFC's RMIS system.	CWT recovery data and report to PSMFC	
9	1/1999	12/1999	RMPC: Provide regional CWT data management	Provide timely access to all reported CWT release and recovery data	3.00%
10	1/1999	12/1999	RMPC: Provide regional coordination of marking programs.	Provide forum for development of regional agreements on fish marking.	1.00%
				Total	100.00%

Schedule constraints

Sampling programs are dependent upon the timing of the various fisheries. As such, any management adjustments in the fisheries (i.e. early closures or extended seasons) may necessitate changes to sampling schedules.

Completion date

N/A. Ongoing basic data collection and monitoring program for stock identification studies.

Section 5. Budget

FY99 project budget (BPA obligated): \$1,778,597

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel	ODFW, WDFW, PSMFC (primarily field sampling personnel)	%46	888,704
Fringe benefits	ODFW (36%), WDFW (16%-37%), PSMFC (37%)	%16	304,592
Supplies, materials, non-expendable property	30 data loggers, parts, software (\$60,000); rain gear, sampling gear	%4	78,193
Operations & maintenance	Includes PSMFC computer operations (\$39,289)	%3	51,457

Capital acquisitions or improvements (e.g. land, buildings, major equip.)	Computer (\$3,500), software, printer	%0	3,500
NEPA costs		%0	0
Construction-related support		%0	0
PIT tags	# of tags: 0	%0	0
Travel	Vehicles, mileage, per diem, & lodging: ODFW (\$43,429); WDFW (\$19,310)	%3	62,739
Indirect costs	ODFW (35.5%), WDFW (22%); PSMFC (15%)	%18	348,867
Subcontractor	CEDC (\$15,000); PSMFC (\$148,533): includes additional \$42,700 for vehicle rent for field samplers	%9	163,533
Other	PSMFC administrative fee on pass-through funds (2%)	%1	21,913
TOTAL BPA FY2000 BUDGET REQUEST			\$1,923,498

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
ODFW-Columbia River Sampling:		%0	
Wallup/Breaux	Columbia River Sport Creel Program	%4	153,800
Corps of Engineers	CWT marking and recovery at Bonneville Hatchery	%2	82,109
Pacific Salmon Treaty	Columbia River commercial and sport fisheries sampling	%1	32,681
Oregon State Funds	Sport and commercial fisheries sampling, spawning ground surveys, hatchery sampling, data analysis, run reconstruction, supervisory duties	%4	160,911
WDFW-Columbia River Sampling:		%0	
WDFW	Mass marked coho sampling assistance	%1	40,000
WDFW	CWT Recovery Project supervision	%0	16,000
WDFW	Lab CWT decoding and data	%3	125,000

	management		
WDFW	Buoy 10 and coastal sampling	% 5	200,000
WDFW/Tacoma Power/Grant Co. PUD	Hatchery CWT sampling	% 2	70,000
PFMC/CTC	Yakima River fall chinook stock assessment	% 1	50,000
Pacific Corp.	Lewis River wild fall chinook stock assessment	% 1	54,000
ODFW-Ocean Salmon Sampling Program:		% 0	
Pacific Salmon Treaty (NMFS)	Partial funding of ocean sampling program	% 2	68,786
NMFS/AFA Anadromous	Partial funding of ocean sampling program	% 3	125,734
USFWS/SFR	Partial funding of ocean sampling program	% 6	225,667
State Funds	Partial funding of ocean sampling program	% 2	67,779
ODFW-Clackamas Tag Lab		% 0	
Pacific Salmon Treaty	Partial funding of operations	% 0	8,000
NMFS	Partial funding of operations	% 0	2,000
State Funds	Supervisory and data management	% 4	140,000
Miscellaneous Sources	Funding for extraction of federal and tribal tags	% 1	50,000
PSMFC-Regional Mark Processing Center:		% 0	
PSMFC	Partial funding of operations	% 1	32,669
NMFS (Anadromous)	Partial funding of operations	% 2	65,338
Pacific Salmon Treaty (USFWS)	Partial funding of operations	% 5	200,000
**This listing does not related federal and tribal hatchery and spawning ground tag recovery sampling	Examples include USFWS hatcheries (Spring Cr, Carson, Little White Salmon, Klickitat spawning grounds, Yakima River spawning grounds, and Umatilla hatchery and spawning grounds.	% 0	
Total project cost (including BPA portion)			\$3,893,972

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	\$2,019,673	\$2,120,657	\$2,226,690	\$2,338,024

Section 6. References

Watershed?	Reference
<input type="checkbox"/>	Blankenship, L. 1981. Coded-wire tag loss study. Washington Department of Fisheries, Technical Report No. 65, Olympia, Washington.
<input type="checkbox"/>	Jefferts, K.B., P.K. Bergman, and H.F. Fiscus. 1963. A coded-wire identification system for macro-organisms. <i>Nature</i> 198:460-462.
<input type="checkbox"/>	Vreeland, R.R. An experimental design for studies of contribution to fisheries by salmonid hatcheries. Master's thesis. University of Washington, Seattle.
<input type="checkbox"/>	PMFC (Pacific States Fisheries Commission). 1982a. Workshop on coded wire tagging experimental design: results and recommendations. Pacific States Marine Fisheries Commission, Portland, OR.
<input type="checkbox"/>	PMFC (Pacific States Fisheries Commission). 1982b. Workshop on coded wire tag recovery and estimation procedures for Pacific salmon and steelhead. Pacific States Marine Fisheries Commission, Portland, OR.
<input type="checkbox"/>	Worland, D.D., R.J. Wahle, and P.D. Zimmer. 1969. Contribution of Columbia River hatcheries to harvest of fall chinook salmon (<i>Oncorhynchus tshawytscha</i>). <i>U.S. Fish and Wildlife Service Fishery Bulletin</i> 67:361-391.
<input type="checkbox"/>	Lapi, L., M. Hamer, and B. Johnson. 1990. Data organization and coding for a coastwide mark-recovery data system. <i>American Fisheries Society Symposium</i> 7:720-724.
<input type="checkbox"/>	Pascual, M.A. 1993. The estimation of salmon population parameters from coded wire tag data. Doctoral dissertation. University of Washington, Seattle.
<input type="checkbox"/>	de Libero, F.E. 1986. A statistical assessment of the use of the coded wire tag for chinook (<i>Oncorhynchus tshawytscha</i>) and coho (<i>Oncorhynchus kisutch</i>) studies. Doctoral dissertation. University of Washington, Seattle.
<input type="checkbox"/>	Johnson, J.K. 1990. Regional overview of coded wire tagging of anadromous salmon and steelhead in northwest America. <i>American Fisheries Society Symposium</i> 7:782-816.
<input type="checkbox"/>	Johnson, J.K. and R.N. Thompson. 1989. Status of chinook and coho salmon stock identification efforts for Pacific coastal production areas of the U.S. and Canada. <i>U.S. Fish and Wildlife Service Project No. AFS-125-1</i> . 328 pp.
<input type="checkbox"/>	Hankin, D.G. and S.M. Mohr. 1990. Determination of levels of coded-wire tagging needed to support time/area harvest management. Final contract report to Klamath River Technical Advisory Team.
<input type="checkbox"/>	Jenkinson, D.W., and H.T. Bilton. 1981. Additional guidelines to marking and coded wire tagging of juvenile salmon. <i>Canadian Technical Report of Fisheries and Aquatic Sciences</i> No. 1051. 24 pp.
<input type="checkbox"/>	Coronado, C. and R. Hillborn. 1998. Spatial and temporal factors affecting

	survival in coho salmon (<i>Oncorhynchus kisutch</i>) in the Pacific Northwest. <i>Can. J. Fish. Aquat. Sci.</i> 55: 2067-2077.
<input type="checkbox"/>	Hoffman, A., C. Busack and C. Knudsen. 1994. Experimental designs for testing differences in survival among salmonid populations. U.S. Dept. Energy, BPA Technical Report. DOE/BP-0029-3. 71 pp.
<input type="checkbox"/>	Reisenbichler, R.R., and N.A. Hartmann. 1978. Effect of number of marked fish and years of repetition on precision in studies of contribution to a fishery. Oregon Department of Fish and Wildlife, Information Report 78-2, Portland, Oregon.
<input type="checkbox"/>	Lewis, M.A. 1996. Stock Assessment of anadromous salmonids. Oregon Department of Fish and Wildlife, Annual Progress Report, Portland, Oregon.
<input type="checkbox"/>	Lewis, M.A., C. Mallette, and W.M. Murray. 1997. Annual coded wire tag program, Oregon missing production groups. Annual Report 1996, Bonneville Power Administration, Portland, Oregon.
<input type="checkbox"/>	Byrne, J., H.J. Fuss and C. Ashbrook. 1998. Annual Coded-Wire Tag Program, Washington Missing Production Groups. Annual Report 1997. DOE/BP01873, Bonneville Power Administration, Portland, Oregon.
<input type="checkbox"/>	Beamesderfer, R., C. LeFleur, T. Roth, C. Tracy, and H. Yuen. December 1997. Snake River spring and summer chinook forecasts for 1998. Unpublished Memorandum. WDFW Region 5 Fish Management Program, Vancouver, WA.
<input type="checkbox"/>	Beamesderfer, R., J. Watts, and P. Frazier. December 1997. 1998 Willamette spring chinook prediction. Unpublished memo. ODFW. Columbia River Management, Clackamas, OR. 13 pp.
<input type="checkbox"/>	Bosch, B., and S. Parker. December 1997. Run size forecast for Columbia River upriver adult summer chinook, 1998. Yakama Nation Fisheries Resource Management, Toppenish, WA.
<input type="checkbox"/>	Fiscus, H. May 1996. 1995 WDFW sport sampling summary for salmon, steelhead and shad from the lower Columbia, and tributaries. WDFW Region 5 Fish Management Program, Vancouver, WA. Columbia River Progress Report 96-09. 11 pp.
<input type="checkbox"/>	Foster, C. September 1997. 1996 Willamette River spring chinook salmon run, fisheries, and passage at Willamette Falls. ODFW. Columbia River Management, Clackamas, OR. 90 pp.
<input type="checkbox"/>	Harlan, K. March 1997. Fall chinook salmon skin color and adipose fin mark observations at Bonneville Dam, 1996. WDFW Region 5 Fish Management Program, Vancouver, WA. Columbia River Progress Report 97-6. 35 pp.
<input type="checkbox"/>	Hymer, J. March, 1991. Age and stock composition of fall chinook salmon returning to Washington Columbia River hatcheries, 1990. WDFW Region 5 Fish Management Program, Vancouver, WA. Columbia River Progress Report 91-11. 32 pp.
<input type="checkbox"/>	Melcher, C. December 1997. The 1996 lower Columbia River and Buoy 10 recreational fisheries. ODFW. Columbia River Management, Clackamas, OR. 85 pp.
<input type="checkbox"/>	ODFW/WDFW. January 1998. Report concerning commercial seasons for

	spring chinook, sturgeon, shad, smelt, and other fisheries and miscellaneous regulations for 1998. Joint Columbia River Management Staff. Clackamas, OR/Battle Ground, WA. 38 pp.
<input type="checkbox"/>	Parties to U.S. v. Oregon 1996. 1996-1998 management agreement for upper Columbia River spring chinook, summer chinook, and sockeye. Columbia River Inter-tribal Fish Commission, Portland, OR. 14 pp.
<input type="checkbox"/>	Pettit, R. December 1996. Age and stock composition of spring chinook salmon returning to Washington Department of Fish and Wildlife Columbia River hatcheries, 1996. WDFW Region 5 Fish Management Program, Vancouver, WA. Col. River Progress Rept 96-20.
<input type="checkbox"/>	Pettit, R. December 1997. Forecasts for 1998 spring chinook returns to Washington lower Columbia River tributaries. WDFW. Region 5 Fish Management Program, Vancouver, WA. Columbia River Progress Report 97-21. 3 pp.
<input type="checkbox"/>	Pettit, R. December 1997. Run size forecast for Columbia River upriver adult spring chinook, 1998. WDFW. Region 5 Fish Management Program, Vancouver, WA. Columbia River Progress Report 97-18. 10 pp.
<input type="checkbox"/>	Schindler, E. D., T. L. Loynes, and R. J. Kaiser. 1997. The 1995 Oregon Ocean Salmon Fisheries. Oregon Department of Fish and Wildlife, Marine Resources Program Contract 95-42. 111 pp.
<input type="checkbox"/>	Technical Advisory Committee. 1997. 1996 all species review, Columbia River fish management plan. ODFW. Columbia River Management, Clackamas, OR.
<input type="checkbox"/>	Technical Advisory Committee. Jan 1996. Biological assessment of the impacts of anticipated 1996-98 winter, spring, and summer season mainstem Columbia River and tributary fisheries on listed Snake River salmon species under the Endangered Species Act.
<input type="checkbox"/>	Technical Advisory Committee. Dec 1997. Updated tables and appendices for the biological assessment of the impacts of anticipated 1996-98 winter, spring, and summer season mainstem Columbia River and tributary fisheries on listed Snake River salmon...
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<input type="checkbox"/>	

PART II - NARRATIVE

Section 7. Abstract

The Coded-Wire Tag (CWT) Recovery Project is an on-going data collection and data management program by ODFW, WDFW, and PSMFC that contributes to the annual assessment of hatchery and wild salmon populations throughout the Columbia Basin. In specific, the goal of this project is to sample statistically valid numbers of chinook and

coho in the Columbia River and Oregon coastal commercial and recreational fisheries and the escapement. Annually, the CWT recovery data from marked groups is used to estimate survival, catch distribution, ocean escapement, and returns to hatcheries and spawning grounds. These data also document long-term trends for evaluation of hatchery stocks as surrogates for critical wild stocks, and for comparison with other long-term data sets from throughout the west coast.

The Fish and Wildlife Program has goals for monitoring and evaluation (Section 3), restoration of wild stocks (Sections 4 & 7), increased hatchery effectiveness (Section 7), improved passage around dams (Sections 5 & 6), and improved stock assessment and harvest management (Section 8). This project is expected to contribute to these goals by providing annual monitoring, as well as a long-term, consistent data base that contributes to modeling efforts such as used in the PATH project. These data will ultimately be used to address critical uncertainties identified in the Fish and Wildlife Program as well as for managing the Columbia River.

Section 8. Project description

a. Technical and/or scientific background

The coded wire tag (CWT) is widely used by fisheries agencies on the west coast as the major stock identification tool for monitoring the status of hatchery and wild salmonid stocks (Johnson, 1990).. This is particularly true in the Columbia Basin where a wide range of CWT marking studies are on-going. On a comparative basis, appropriately 40% of the 45-50 million tags annually released coastwide originate in the Columbia Basin. BPA directly funds approximately one third of these latter releases (5-7 million yearly).

ODFW and WDFW jointly carry out a well coordinated sampling effort (*minimum* 20% rate; PMFC, 1982b) to collect CWTs from mature salmon and steelhead which return to fishery (sport and commercial) and escapement areas (natural spawning grounds, hatcheries, and Bonneville Dam fishways). Sampled heads of tagged fish are transported to tag recovery labs at Clackamas and Olympia for CWT recovery and decoding. The CWT recovery and related catch/sample data are forwarded to PSMFC's Regional Mark Processing Center where it is validated and made available to users via the on-line 'Regional Mark Information System'.

The CWT recovery data provide critical information for evaluating various Columbia Basin stock rebuilding programs as well as studies on stock selection, disease and diet evaluations, rearing density studies, evaluation of juvenile passage of hydroelectric dams, overall contribution studies and current life history parameters. It also provides in-season and post-season fishery and escapement abundance and stock specific information on Columbia River salmonid stocks. This information allows the development of accurate run size forecasts used in modeling west coast as well as inside fisheries for the purpose of regulation development

Marked hatchery fish function as indicator stocks and provide estimates of survival and exploitation rates for wild fish and aid in monitoring the status of listed salmonid

populations. Indicators stocks also are used to limit harvest of Columbia River salmonids in ocean and Columbia River fisheries.

b. Rationale and significance to Regional Programs

The data generated from the long-term CWT tag program are key, if not essential, in meeting many of the stock assessment and hatchery production monitoring goals and objectives of the 1994 Fish and Wildlife Program. These include: Monitoring and evaluation (Section 3); Restoration of wild stocks (Sections 4 and 7); Increased hatchery effectiveness (Section 7); Improved passage around dams (Sections 5 and 6); and Improved stock assessment and harvest management (Section 8).

CWT recovery data also have provided the ability to prioritize hatchery production programs that lead to better cost effectiveness. Hatchery programs that are successful can be identified and enhanced while release groups that perform poorly can be eliminated. One such example, is the hatchery program in Youngs Bay (Select Area Fisheries Project, 9306000) that provides for terminal area fisheries in the Columbia River with minimal by-catch of critical stocks and minimal straying into adjacent rivers. The data generated by the Annual Stock Assessment projects (8906500, 8906600, 8906900) are also used in the Artificial Production Review for the Columbia Basin. This project provides tag groups that can be used to model wild populations that are too sensitive to capture and tag as well as provides a useful tool to compare wild populations that can be similarly tagged with similar hatchery populations. It also provides a tool to assess productivity differences between upriver and lower river populations.

Lastly, monitoring and evaluation are central themes of the 1994 Fish and Wildlife Program. Expansion of fish marking programs is specifically called for in Section 8.4D.1. The need for a hatchery monitoring and evaluation program is identified in several other Basin plans. For example, the Snake River Recovery Plan (2.1.d.5) and the Hydrosystem Operations Biological Opinion (VIII.A.13) call for the establishment of a comprehensive monitoring, evaluation and research program. Each of the plans identifies a critical need to determine the proportion of wild and hatchery fish in both fishery catches and escapement (spawning grounds and hatchery racks). *Without the ability to identify the origin of these fish, the ability to effectively manage recovery efforts and account for actions is non-existent.*

In summary, the coded-wire tag program meets the goals of the 1994 Fish and Wildlife Program by providing a tool that: (1) better accounts for proportions of weak or critical stocks in the mixed stock fisheries from California to Alaska, and especially in the fisheries and spawning grounds of the Columbia River system; (2) better accounts for the number of fish of each stock, wild or hatchery, that is recovered in various escapement areas (dams, hatcheries, spawning grounds; (3) allows monitoring and evaluation of hatchery practices such that poorly performing production groups can be identified and changed or eliminated, as well as allows for identification of strays and determination of total hatchery adult production.

c. Relationships to other projects

This project is part of the Coded-Wire Tag Program Umbrella, which consists of four BPA funded coded-wire tagging projects. The other projects in this umbrella group are: Annual Stock Assessment - CWT (USFWS) (#8906500); Annual Stock Assessment - CWT (WDFW) (#8906600); and Annual Stock Assessment - CWT (ODFW) (#8906900). The goal of this umbrella is to insure comprehensive monitoring and evaluation of all Columbia Basin hatchery salmon production. Project numbers 8906500, 8906600 and 8906900 provide funding for coded-wire tagging, while project number 8201300 focuses on sampling for tagged fish in all recovery areas as well as data compilation and data management. Collectively these projects compose a multi-year, milestone-based program. Milestones for this program include:

- (1) Representative tag group with each hatchery production release;
- (2) Statistically valid number of observed recoveries per group (30);
- (3) Adequate sampling of ocean and Columbia River mainstem commercial and sport fisheries plus freshwater escapement areas (minimum 20% level);
- (4) Data available regionwide in a timely manner.

CWT recovery data also are valuable to several other agencies whose actions have a large effect on the health of Columbia River salmonid populations. The federal ESA depends on CWT marked hatchery fish to function as surrogates for wild listed populations. Marked hatchery fish function as indicator stocks that provide estimates of survival and exploitation rates for wild fish and aid in monitoring the status of listed salmonid populations. Indicator stocks are also used to limit harvest of Columbia River salmonids in ocean and Columbia River fisheries. The *U.S. v. Oregon* Columbia River Compact, U.S./Canada Salmon Treaty, and PFMC (management of domestic ocean fisheries) all depend on the CWT recovery program to manage fisheries to limit the harvest of listed salmonids while targeting on harvestable hatchery reared fish. CWT recovery data are also essential for the BPA funded PATH program whose purpose is to identify factors limiting salmonid survival in the Columbia River Basin.

d. Project history (for ongoing projects)

Project 8201300 (1982-Present): The extensive coastwide CWT recovery effort costs an estimated 11.5-12 million dollars annually. These costs are primarily borne by Oregon, Washington, California, Alaska and British Columbia. However, since 1982, BPA has funded a 'fair share' portion of the CWT recovery costs (Project 8201300) for the Columbia Basin sport and commercial fisheries and Oregon's ocean fisheries because of mitigation responsibilities and the significant impact of BPA funded tagging studies. Approximately 40% of the 17-21 million CWT marked salmon released annually in the Columbia River Basin are funded by BPA. Oregon and Washington's freshwater and ocean CWT recovery programs are impacted the most, with approximately 15% of the recoveries coming from BPA funded releases.

In 1992, BPA expanded its funding to include partial support of the operational costs of PSMFC's Regional Mark Processing Center in accomplishing its role as a centralized coordination and data management center for all CWT release and recovery data plus associated catch and sample information.

Adaptive Management Implications: For more than 25 years, the collection and analysis of CWT recovery data from Columbia Basin and coastal hatchery stocks has provided a reliable and vital basis for identification of Columbia Basin stocks of chinook, coho, and steelhead taken in the various commercial and sport fisheries and escapement. The CWT data are used to stratify fishery and escapement salmonid populations by stock, age, distribution, and run timing. The data also are used to reconstruct salmonid runs which are critical to building data sets used to predict their abundance. These estimates of abundance (e.g., fall chinook) are used to model various catch and escapement scenarios necessary protect threatened stocks and meet ESA impact restraints.

Information obtained from tagged fish is also used to adjust hatchery rearing and release plans, prioritize hatchery production programs, and evaluate and adjust harvest management strategies. For example, tagging of tule fall chinook has shown low survivals over many years. This and other information was included in budget evaluations and ultimately led to elimination of tule fall chinook releases at Bonneville and Stayton Pond hatcheries. Tagging data has demonstrated dramatic variation in survival of hatchery coho salmon by month of release. This has resulted in changes in hatchery releases strategies to reduce the risk of catastrophic survival failure by spreading production releases over time instead of concentrating on a single release time..

Project Reports and Technical Papers:

Joint ODFW/WDFW reports:

- a) Columbia River Fish Runs and Fisheries - Annual Status Report.
- b) The Lower Columbia River and Buoy 10 Recreational Fisheries.

ODFW reports:

- a) Willamette River Spring Chinook Salmon Run, Fisheries, and Passage at Willamette Falls.
- b) Status of Willamette Spring Chinook Run and Run Size Prediction.
- c) Preliminary Results of Columbia River Commercial Fisheries.
- d) Status Report: Oregon's Ocean Salmon Fisheries

WDFW Reports:

- a) Hatchery age and stock composition of spring and fall chinook returning to Washington hatcheries.
- b) Age and stock composition of natural spawning populations of spring and fall chinook returning to Washington tributaries.
- c) Summary of CWT recoveries on spawning grounds in Washington.
- d) Summary of CWT recoveries in Washington tributary fisheries.
- e) Bonneville Dam observations.
- f) Accountability of spring and fall chinook returns to the Columbia River basin and preseason forecasts.

g) Coho database for OPI (Oregon Production Index).

PSMFC Reports:

The Mark Center no longer produces hardcopy reports on CWT recoveries because of frequent data submissions and revisions. However, all CWT recovery and release data are available via the online data retrieval system (RMIS) or by request. The associated Catch/Sample data are available via request to the Mark Center.

Other Reports:

Direct management applications of this information are provided to the Pacific Fishery Management Council (PFMC) for inclusion in their annual Review of Ocean Salmon Fisheries and pre-season salmon management reports (stock assessments and evaluation of annual fishery options). The CWT information is also instrumental in the assessment of critical regional salmonid stocks under the US/Canada Salmon Interception Treaty, and their monitoring of stock rebuilding through the Pacific Salmon Commission (PSC). Collected CWT information is reported by the PSC's technical committees in annual technical reports. Recent evaluations of Columbia River salmonid stocks for possible listing under the federal ESA are included in federal Stock Status reviews.

Major Results Achieved: For the past two decades, CWT recoveries from sampled ocean and Columbia River fisheries and escapement have provided regional managers with the information to: 1) define distribution, contribution, exploitation rates, and survival rates for Columbia River stocks; 2) set present and future management strategies; 3) establish regional coordination and consistent evaluation standards to assess specific salmon stocks and their contribution to California, Oregon, Washington, Canadian, and Southeast Alaska fisheries; and 4) assess potential listing for Columbia River stocks under the federal ESA.

Funding History (18 years):	1982-1994	\$10,352,353
	1995	1,241,271
All Years: \$17,566,851	1996	1,251,738
Ave/Year: 975,936	1997	1,400,759
	1998	1,542,133
	1999	1,778,597

e. Proposal objectives

Project Component 1: Columbia River CWT Recovery Program (ODFW/WDFW)

Objective 1 - Snout Recovery : Sample salmon and steelhead landed in Columbia River sport and commercial fisheries and returning to escapement areas at a minimum 20% sampling rate to ensure adequate CWT recoveries for most stocks in the fisheries.

Ancillary sampling occurs in mainstem sport fisheries above Bonneville Dam, in significant tributary fisheries, and at the hatcheries and natural spawning areas. These ancillary sampling programs seldom achieve the 20% goal. Tributary fishery sampling is conducted with the objective of sampling every major tributary on the Washington side of the river. Escapement area sampling also occurs in all major Washington tributaries to recover CWTs on spawning grounds.

Products: Recovery of snouts of CWT marked salmon and steelhead throughout the lower 146 miles of the Columbia River.

Objective 2 - Creel Census and Escapement Area Programs: Estimate total harvest in commercial fisheries and total effort and catch in recreational fisheries where CWT's are recovered. Provide expansion factors for all CWTs recovered. Document total fall chinook returns to hatchery facilities, produce spring and fall chinook spawning population estimates for Columbia River tributaries, and perform stock separation for fall chinook and summer steelhead at Bonneville Dam.

Products:

- Sampling rates necessary for determining CWT expansion factors.
- Total landings (day and species) for Columbia River commercial and tribal fisheries.
- Estimates of total catch and effort by species for lower Columbia R. sport fisheries.
- Estimates of effort and catch by species for mainstem Columbia River sport fisheries.
- Population estimates for fall chinook and coho spawning in lower Columbia R. tribs.
- Estimates of fall chinook returns to lower Columbia River fall chinook hatcheries.
- Bright/Tule daily stock composition for fall chinook passing Bonneville Dam.
- Hatchery/wild composition for A and B summer steelhead passing Bonneville Dam.
- Population estimates by tributary of spring and fall chinook in Washington tribs.
- Catch by month of salmon in Washington tributary recreational fisheries.
- Catch and effort on fall chinook in the Hanford Reach recreational fishery.
- Estimates of the spawning population of fall chinook in the Hanford Reach.
- Bright/Tule daily stock composition for fall chinook passing Bonneville Dam.

Objective 3 - Data Analysis and Delivery: Summarize and analyze data for use in determining status of wild and natural salmon and steelhead populations in the Columbia River Basin. Analyze CWT recoveries for survival, distribution, harvest rates, and contribution to fisheries. Report verified catch and sample data to the Regional Mark Processing Center for merging into the regional CWT database.

Products:

- Merged and verified data transferred to the Regional Mark Processing Center.
- Age and stock composition for all Columbia R. mainstem and tributary fisheries.
- Run reconstruction for all major Col. R. salmonid stocks and ESA listed substocks.
- Survival and harvest rates for specific salmon stocks.
- Preseason forecasts for all major salmonid stocks and ESA substocks.
- Historical databases for Columbia River salmon stocks.
- Annual status reports summarizing fish runs, population status, fisheries, and escapements (See Section 7.D above for list of 14 reports).

Project Component 2: Oregon Ocean Fisheries CWT Sampling (ODFW)

Objective 4 - CWT Recovery in Ocean Fisheries: Recover CWTs from chinook and coho salmon landed in Oregon's ocean commercial troll and sport fisheries. The goal is to implement a stratified representative sampling program that samples a minimum of 20% of landed catch for all time and catch area cells in the various fisheries covering ports along the 310 miles of the Oregon Coast. CWT sampling occurs within the normal

distribution of each port's weekly commercial and sport landings. Although minimum sampling rates are achieved for most sampling weeks in both troll and sport fisheries, it is difficult to sample all times and areas coastwide to meet this objective.

Products: Recovery of chinook and coho salmon snouts containing CWTs.

Objective 5 - Determine Total Commercial Troll/Sport Landings and Effort:

Oregon's total ocean commercial troll and sport salmon effort and harvest by time and catch area are estimated from expansions of sampled data in both fisheries. The goal is to sample troll landed commercial catch for average weights by "grade" to provide expansion factors to determine total salmon landed by time period and ocean catch area. In the Oregon ocean sport fishery, estimates of total ocean effort are made by port and catch area. Recreational vessels and anglers are sampled by trip type (salmon, bottom fish, combination, tuna, etc.), boat type (charter and private), and for number of anglers and catch per vessel to determine expansion factors to calculate total port and ocean catch area salmon landings. Total landing estimates are necessary to match with collected CWT data within PSMFC's regional CWT mark information system (RMIS).

Products:

- Total commercial troll landings in numbers of fish, by species, time, area.
- Estimated total recreational vessel effort by time, port, and area.
- Estimated average anglers/vessel and catch (by species)/trip, time and area.
- Total recreational landings in numbers of fish, by species, time, and area.

Objective 6 - Data Analysis and Delivery. Summarize and analyze CWT data to determine the stock composition of stocks represented in Oregon ocean salmon fisheries by species, time and area. Determine contribution, distribution, and survival rates of wild and hatchery stocks of Columbia River basin chinook and coho caught in these fisheries. Report Oregon total ocean salmon catch and CWT data to PSMFC's Regional Mark Processing Center for merging into the RMIS system.

Products:

- CWT recovery data merged with catch/sample data and transferred to the RMPC.
- In-season reports of observed CWT recoveries by hatchery origin and port of landing
- CWT information distributed to fishers with sampled CWT fish in their catch.
- Widely distributed reports summarizing CWT data collected by the project.
- Run reconstruction and survival rates for Columbia River salmon stocks.
- Predict run sizes for Columbia River salmon stocks.
- Representations of Columbia River stocks in PSMFC ocean salmon fisheries.

Project Component 3: Clackamas CWT Processing Center (ODFW)

Objective 7 - Tag Recovery. Transport sampled fish snouts to the Clackamas Tag Recovery Lab for CWT extraction. Snouts includes those sampled by WDFW in the Columbia River mainstem fisheries landed in Washington.

Products: - Recovery and decoding of ODFW and WDFW sampled CWTs.

Objective 8 - Data Delivery. Verify and report CWT decodings to ODFW's data management operations and to PSMFC's Regional Mark Processing Center.

Products:

- Electronic data entry, verification and transfer to PSMFC.
- On-site archival collection of recovered tags released in Oregon.
- Recovered tags of non-Oregon origin returned to the releasing agencies.

Project Component 4: Regional Mark Processing Center (PSMFC)

Objective 9 - Regional CWT Data Management. Verify and then merge all Columbia River and Oregon ocean CWT recovery and catch sample data into the regional CWT database.

Products:

- User access to regional CWT release, recovery, and catch/sample data via PSMFC's on-line "Regional Mark Information System" (RMIS).
- Access available via direct dial-up, telnet, ftp, or the internet.
- Data accessible in standard reports or as individual records in csv or PSC format.
- Annual hard copy report on regional CWT releases widely distributed.

Objective 10 - Regional Mark Coordination. Provide coastwide coordination for fin marking and CWT release and recovery programs.

Products:

- Convene annual Mark Meeting to address current issues and establish new or revised regional marking agreements on fish marking.
- Serve on various regional committees involved with CWTs and fin marking, including PSC Data Sharing, Data Standards, and Catch/Effort.

f. Methods

1. Columbia Basin CWT Sampling Program (Objectives 1-2)

ODFW and WDFW jointly share the task of sampling the Columbia River sport and commercial fisheries for CWT marked salmonids throughout the lower 395 miles of the Columbia River stretching from the mouth at Buoy 10 to the Priest Rapids Dam. The primary mainstem sport fisheries occur below Bonneville Dam (including Buoy 10) and at Hanford Reach on the upper Columbia. Tributary sport fisheries primarily occur below The Dalles Dam. The treaty Indian commercial fisheries operates between Bonneville and McNary Dams while the non-Indian commercial fishery is limited to below Bonneville Dam. Additional sampling occurs for fish returning to hatcheries and natural escapement areas.

The goal is to sample a minimum of 20% of the salmon and steelhead landed for the presence of CWT's. The 20% minimum sampling rate is a regionally agreed upon sampling rate (PMFC, 1982b) designed to ensure that CWT recoveries will be adequate for developing stock composition estimates of the fishery and also to ensure that most stocks of low abundance will be adequately recovered in the fishery. Fish containing a CWT will have their snout removed and will be sampled for pertinent biological data.

Pertinent biological data will vary from project to project and may include length, weight, sex, skin color, other marks, and a scale sample.

Columbia River Commercial Fisheries: Columbia River non-Indian and Treaty Indian commercial salmon and steelhead fisheries may occur during February through October, but the majority of the landings occur from mid-August through October. Seasons are set during the year based on expected run strength of various salmon and steelhead stocks. In recent years, the ESA has severely restricted mainstem non-Indian commercial fisheries and has greatly increased the need for precise stock accounting in fisheries. The BPA funded Select Area Fishery Enhancement Project has increased the time and area in which Columbia River non-Indian commercial fisheries occur in select areas. These fisheries generally occur during late April through early June and August through October and have effectively harvested net-pen reared salmon while limiting the handle of ESA listed fish.

Catches are sampled for CWTs at the commercial fish processing plants. A random portion of the catch also is sampled for average weight and pertinent biological data. These data are used to determine species specific average weights that are applied to poundages recorded on fish tickets to estimate the total salmonid catch by species in Columbia River Treaty Indian and non-Indian fisheries.

Columbia River Sport Fisheries: The sport fishery on the lower Columbia River occurs year round with the majority of the catch occurring during mid-February through March and late-May through September. The salmonid catch is comprised of spring chinook, summer steelhead, coho, and fall chinook. Sport anglers encountered on the water, at bank fishing locations and at boat ramps or moorages are queried regarding success in catching fish. Boat and bank effort are estimated by aerial 'fly over' counts conducted over the lower Columbia River twice a week during February through October. These data are used as part of a statistical creel program that will estimate monthly effort and catch for lower Columbia River salmonid fisheries. This fishery has been sampled as part of a statistical creel program since 1969.

The sport fishery located near the Columbia mouth is known as the Buoy 10 fishery and occurs early August through mid-October. The vast majority of the Buoy 10 catch is fall chinook and coho. The fishery has been sampled since its resurgence in 1982. Effort and catch is estimated on a weekly basis and is not part of the statistical creel program. Effort is indexed by on ground trailer and rod counts at popular launch sites and bank angling locations. Anglers are queried for success at boat ramps and bank fishing locations, but no on-water sampling occurs.

The lower Willamette and lower Clackamas sport fisheries occur late January through late June and are directed at spring chinook. These fisheries have been sampled since 1946. Boat and bank effort is estimated on a weekly basis and effort is indexed by aerial counts conducted twice a week during February through June. Anglers are queried for success at boat ramps, moorages, and bank fishing locations, but no on- water sampling occurs. These data will be used as part of a statistical creel program that will estimate

weekly effort and catch for lower Willamette and Clackamas River spring chinook fisheries.

Effort and catch data are used to estimate Washington tributary spring chinook fisheries which typically occur between April and June. The fisheries occur on lower Columbia and Bonneville Pool tributaries plus Ringold on the upper mainstem Columbia. Anglers are queried for success at boat ramps and bank fishing locations. Effort is estimated based on number of boats and bank angler counts. Bonneville Pool tributaries are managed jointly between WDFW and Yakama Indian Nation (YIN) to meet hatchery escapement goals in addition to harvest sharing.

The Hanford Reach fishery occurs from mid-August through October. Anglers are interviewed at boat ramps or bank fishing locations. Trailer counts are made to estimate total effort. Angler success data is used to estimate total catch. In addition, limited creel sampling of the salmonid sport fisheries in the mainstem Columbia River between Bonneville and McNary Dams began in 1994.

Hatchery Sampling: Spring and fall chinook plus coho are sampled at several Columbia River hatcheries and spawning grounds between the mouth of the Columbia and Priest Rapids Dam from August through January. In conjunction with biological sampling, snouts are recovered from fish containing CWTs.

Spawning Ground Surveys: Spring and fall chinook plus coho are sampled in the Columbia River mainstem and tributaries from the mouth of the Columbia to Priest Rapids Dam from August through January. Peak counts (redd or live and dead fish) are used to estimate the total natural spawning populations. In addition to sampling for CWT's and biological data, fish are separated according to stock based on skin color or external marks. In addition, fish counts are divided into adults and jacks.

Selective Fisheries and Electronic Sampling: Most hatchery coho now returning to the Columbia River are adipose marked as a flag for hatchery origin. Therefore, electronic equipment will be required for the detection of CWTs. This situation will greatly reduce the efficiency of the CWT sampling process and necessitate additional samplers to attain the current sampling rates in fisheries and at escapement areas.

2. Oregon Ocean Fisheries CWT Sampling (Objectives 4-5)

Oregon's ocean commercial troll and recreational fisheries target a multitude of regional and West Coast chinook and coho salmon stocks along the approximately 310 miles of the Oregon Coast and in both state and federal offshore waters. The evaluation of Columbia River salmonid stocks through BPA-funded CWT sampling is an essential component for determining stock composition, distribution, and survival characteristics of these important stocks. Recent inclusion of several Columbia River system stocks under the federal Endangered Species Act (ESA) and other critical stocks have increased the need for information for evaluating impacts in regional fisheries. It is also needed to

provide life history information to evaluate stock rebuilding strategies and management alternatives.

ODFW's Ocean Salmon Management Program implements the statistically-based and unified ocean salmon sampling and CWT collection program that has been in place since 1979. Project objectives are to: (1) implement non-biased representative sampling at a minimum rate of 20% of landings by week, catch area (troll) and port (recreational), and species strata; (2) provide necessary CWT sampling and recovery data to evaluate stock contribution and distribution characteristics in Oregon's ocean fisheries; (3) provide information for evaluating stock survival rates; and (4) deliver collected data into PSMFC's regional RMIS database and make it available for regional and international salmon management forums to implement management strategies that meet harvest impact criteria for Columbia River basin stocks.

Seasonal port samplers are hired to collect CWT and other biological data at 12 coastal ports (Astoria, Garibaldi, Pacific City, Depoe Bay, Newport, Florence, Winchester Bay, Charleston, Bandon, Port Orford, Gold Beach, Brookings).

Funding provided by BPA represents only part of the overall federal/state support necessary to initiate and operate Oregon's yearly ocean salmonid CWT sampling program. The BPA supported approximately one third of the total OSM ocean sampling costs in 1996.

Sampling Commercial Troll Fisheries: Oregon's ocean commercial troll fishery has changed from historically targeting coho to a directed chinook fishery. Critical wild salmonid stock management and rebuilding needs for such stocks as Oregon's coastal wild coho have precipitated this change. Ocean troll chinook regulations vary by coastal area, with several ocean areas closed for part or all of the season to reduce harvest impacts on Oregon Coastal Natural (OCN) coho. Additional but limited "late season" state water ocean troll fisheries take place during October and November to harvest healthy local chinook stocks.

The majority of ocean-caught chinook are harvested in August and September, although significant landings are made in all months the season is open. Columbia River stocks are distributed over a wide time and area during the season. In 1996, troll chinook were landed at about 72 buying locations, mostly at Oregon's 12 major coastal ports. Oregon's ocean salmon fisheries are established by the PFMC and the state of Oregon in April each year. Seasons are established on the basis of several factors including regional species (chinook and coho) stock status. Columbia River basin stocks are important in setting these yearly harvest strategies as they include ESA-listed and other "critically" managed Columbia River chinook and coho populations.

Sampling Ocean Sport Fisheries: The sport fishery presently spans the period from mid April through October, with the month of July closed along most of the coast due to high impact levels on Oregon's OCN coho. Several added terminal ocean state waters chinook fisheries take place during October and November and are managed to target

local coastal stocks. Oregon's ocean recreational fisheries are managed to harvest healthy chinook salmon stocks as recent management strategies have increasingly emphasized protection and rebuilding of wild coho stocks.

Some directed ocean coho fishing occurs off the Columbia River mouth in most years between Cape Falcon (OR) and Leadbetter Point (WA) where Columbia River hatchery stocks are concentrated and wild coho stock impacts are low. Oregon's ocean sport chinook catch is spread over the entire season with about one third of the catch occurring in August. The Columbia River ocean area coho fishery takes place during the July-early September period with most of the catch in August.

The ocean sport fishery is sampled at most major coastal ports including multiple charter boat business locations, and private boat fishers at moorages, marinas, and launch ramp sites. The evaluation of this angler and trip effort, expanded landed catch estimates by time and catch area, and CWT sampling are collectively used to evaluate Columbia River basin stock representation in both Oregon and regional fisheries for establishing appropriate management strategies.

3. Clackamas CWT Tag Recovery Lab (Objective 7)

Sampled fish heads are either delivered fresh daily or stored in freezers at various collection locations and retrieved several times a year to provide timely processing and decoding of the CWTs. This also includes a number of trips to Newport on the Oregon coast to retrieve heads recovered in the ocean fisheries.

CWTs are extracted from the fish heads using dissecting tools and electronic tag detection equipment. Decoding is done by cleaning the wire and then reading and verifying the code under a dissection scope. All tags released by ODFW's hatcheries and wild stock tagging programs are archived for possible future reference. Tags recovered from other releasing agencies are returned.

4. Data Analysis and Delivery (Objectives 3, 6, 8)

The codes for the extracted tags are entered and verified on a mainframe computer. Associated fishery/recovery and biological data, collected when snouts are recovered, are uploaded to the mainframe computer and merged with previously entered CWT recovery data. Based on program specific sampling rates, individual tag recoveries are increased by an expansion factor to estimate the total number of that particular tag present in a given fishery, hatchery, or natural escapement area.

CWT recovery data are summarized to estimate the number of CWT's recovered by tag code for each time/area stratum. Following rigorous error checks, the CWT recovery data and associated catch/sample data are transferred to PSMFC and distributed to managers for making inseason fishery management decisions.

Summarized CWT data recoveries, fishery catch estimates, and estimated escapements for most Columbia River salmonid stocks are provided by several state and federal agencies for additional data analysis. Data analysis includes run reconstruction of all major salmonid stocks. Total returns are categorized by age and stock. Included in total returns are fishery catches, escapement estimates for both hatchery and natural spawn fish, and dam counts. Additionally, preseason run size forecasts are developed annually. Data are provided to the *U.S. v. Oregon* TAC on status of ESA listed stocks and is summarized annually in technical reports. Annual stock assessment reports are produced and distributed to fish resource agencies throughout the basin. All resultant databases are updated annually and are used in a variety of management forums

5. Regional CWT Data Management and Mark Coordination (Objectives 9-10)

ODFW and WDFW tag recoveries and associated catch/sample data are subjected to a second battery of error checks when reported to the Regional Mark Processing Center (RMPC). Upon validation, the data are merged into the coastwide database. Data users may query the on-line 'Regional Mark Information System' (RMIS) to obtain tag recovery data (summary reports or raw records) for research and harvest management analysis applications.

RMIS provides on-line access to all coastwide CWT data, including that for the Columbia Basin tagging studies. Data sets include releases, recoveries; catch/sample, and location codes. The Mark Center also serves as the site for exchanging U.S. CWT data with Canada for Pacific Salmon Treaty purposes. All CWT data can be accessed on PSMFC's computer via the following methods:

Telnet:	telenet.psmfc.org
FTP:	ftp.psmfc.org
WWW:	http://www.psmfc.org
dial-up:	(503) 650-5437 (up to 28,800 bps)

6. Critical Uncertainties

Adequate and stable annual funding is critical for maintaining a quality CWT recovery program in order to achieve a wide variety of study results and wide ranging ESA related fisheries management capabilities. Included in a quality CWT recovery program is the need for rapid tag extraction and decoding for use in in-season management decisions. An additional complication is that the tagging and recovery phases of a CWT study are typically separated by two or more years, and thus funded under different fiscal cycles.

7. Key Assumptions

A key assumption is that quality CWT sampling programs will be maintained in the Columbia River fisheries and escapement, as well as the ocean fisheries in order to provide the necessary stock identification information required by researchers and fishery managers to meet many of the Fish and Wildlife Program goals and objectives

A second assumption is that the 20% minimum CWT sampling rate is adequate for the recovery of rare tags such as those pertinent to ESA listed stocks and for determining the survival rates of a specific stock. In actuality, recent declines in run sizes have demonstrated the need to increase sampling effort in some cases to obtain adequate samples for those stocks in lowest abundance.

A third assumption is that tag extraction and decoding will occur on a timely basis for use in in-season fishery management decisions and post-season stock status evaluations.

8. Critical Constraints

A critical constraint in the Columbia River sport fisheries is to reach the minimum CWT sampling rate of 20% because the sport fisheries are spread over large areas. It may not be possible to reach this objective in most cases without increasing the number of samplers at a major increase in overall program costs. In 1994, the CWT sampling goal of 20% was met in most Columbia River sport fisheries because of the increased funding available that year. However, by 1996, funding had decreased and the CWT sampling goal of 20% has not been met in most Columbia River sport fisheries.

Critical constraints in the ocean fisheries include the adoption of harvest regulations that target healthy stocks for specific time periods and areas. Such fisheries are usually of short duration and can break up established sampling routines at various ports, resulting in sampling rates of less than the required 20%. It is important that BPA funding take into account that short duration fisheries require more sampling personnel at higher cost to ensure minimum sampling rates of landings.

g. Facilities and equipment

ODFW Columbia River Sampling Program: The majority of ODFW staff sampling the Columbia River basin are based at Clackamas. Because the sampling programs occur over the lower 148 miles of the Columbia River, vehicle mileage charges represent a sizable portion of the Columbia River program's expenditures on services and supplies. All ODFW vehicles used in this project are leased from the Oregon State Motor Pool.

The Columbia River Management Program also rents office space in Astoria for a full time NRS-1, a half time EBA, and several part time EBA's. This reduces the sampling trips made between Clackamas and Astoria during the spring and summer months when commercial and sport fishing effort greatly increase. In addition, Astoria staff are better able to sample and manage the large fisheries in the lower 20 miles of the Columbia R.

Mass marked coho has necessitated that all coho landings now be electronically sampled with either hand wands or the larger tube detectors. ODFW's Columbia River Sampling Program is equipped with 15 wand tag detectors and two R-8 tube detectors.

WDFW Columbia River Sampling Program: The mainstem Columbia River and its tributaries downstream from McNary Dam are sampled by PSMFC personnel from the

Vancouver office. The staff is comprised of four full time biologists and three technicians and up to two temporary technicians. In Kennewick, one technician is employed for nine months. In addition to sampling spring chinook fisheries and fall chinook data compilation, this person supervises up to seven temporary technicians. These technicians are hired to sample fall chinook from the Hanford Reach sport fishery plus hatchery and natural spawn escapement areas upstream from McNary Dam.

Boats and vehicles are stored at the Vancouver office. Several jet-powered sleds with high powered outboard engines, two rubber rafts, and a drift boat are available to conduct various sampling activities. Cellular phones are used for field communications. WDFW is well equipped for electronic sampling with 12-14 hand wands and three tube detectors available for use. Data loggers are used to capture field sampling data.

ODFW Ocean Sampling Program: The Ocean Salmon Management Program administers ODFW's ocean salmon CWT recovery program. The core OSM program (administration, data, and technical support) is located at Newport, with additional inseason field sampling coordinators located on the north coast at Tillamook and south coast at Charleston. These field staff are responsible to coordinate seasonal field samplers at remote port locations and to ensure effective CWT and biological sampling procedures and data collection.

The OSM program maintains necessary freezer capability to store salmon snouts for CWT recovery at multiple locations. Hand-held "all weather" data entry computers are used to electronically record all ocean fishery interviews and snout (CWT) collection data. Twenty "wand" CWT detectors are available for sampling coho in the fisheries.

ODFW Clackamas Tag Recovery Lab: The lab is well equipped with the necessary freezer units, dissection tools and microscopes, and monitor screens for head storage, tag extractions and decoding. An upgraded personal computer and modems are available for data management needs.

PSMFC Regional Mark Processing Center: The regional CWT data are maintained on a 1000e Sun minicomputer that has proven more than adequate in speed for timely processing of data requests. In addition, PSMFC's data center has a T-1 communication line to support high speed internet access and data transfers.

h. Budget

The proposed FY2000 budget (\$1,923,498) is \$144,901 higher than the FY1999 budget (\$1,778,597). Most of the 8.1% increase is attributable to salary increases, benefits and overhead. With the single minor exception of WDFW's increase of 0.4 FTE's, all four program components are scheduled to operate at the FY1999 level of effort.

A substantial one time increase, however, is seen in Supplies. ODFW and WDFW have requested \$60,000 to purchase 30 hand held data loggers for their field sampling personnel. Twenty units are requested for ODFW samplers and 10 units for WDFW

samplers. The cost of a unit plus necessary programming is \$2,000. The current data logger equipment in use is eight years old and badly in need of replacement and upgrading.

Section 9. Key personnel

Cindy LeFleur
Fish and Wildlife Biologist 4
Washington Department of Fish and Wildlife
Vancouver, Washington

FTE/Hours = 0

Education B.S. Wildlife Science Oregon State University, 1980

Experience and Qualifications

1988 - present: Washington Department of Fish and Wildlife. Currently responsible for the CWT recovery program for the Columbia River. Duties also include primary responsibility for harvest management activities in the Columbia River and Washington tributaries. Involved with the *U.S. v. Oregon* Columbia River Fish Management Plan implementation, review, and all technical aspects.

1980-1988: Pacific States Marine Fisheries Commission. CWT recovery program. Duties included extensive involvement in CWT recovery and analysis for the Columbia River and tributaries. Developed many of the basic methods now used in the analysis today.

1976-1980: Standard training in the Fish and Wildlife Department at Oregon State University

Relevant Publications

Contributed to the following reports as a member of the Technical Advisory Committee:
U.S. v. Oregon Technical Advisory Committee. 1996 All Species Review - Columbia
 River Fish Management Plan. August 4, 1997.

U.S. v. Oregon Technical Advisory Committee. Biological Assessment of the Impacts of Anticipated 1996-98 Winter, Spring, and Summer Season Columbia River Mainstem and Tributary Fisheries on Listed Snake River Salmon Species Under the Endangered Species Act. January 22, 1996.

U.S. v. Oregon Technical Advisory Committee. Biological Assessment of the Impacts of Anticipated 1996-98 Fall Season Columbia River Mainstem and Tributary Fisheries on Snake River Salmon Species Listed Under the Endangered Species Act

Rodney J. Kaiser
Oregon Department of Fish and Wildlife
Marine Resources Section
Ocean Salmon Management Program, Newport

FTE/Hours = 0

Education	M.S. Oceanog./Marine Resource Mgmt.	Oregon State University, 1983
	B.S. Technical Journalism	Oregon State University, 1970
	B.S. Fishery Science	Oregon State University, 1969

Experience

1989-Present: Program Leader, ODFW Marine Resources, Ocean Salmon Management Program., Newport, OR.

Administer, direct, and supervise OSM program, and staff, at Newport, including Oregon's ocean investigative studies, inseason fisheries sampling and harvest management, and PST field chinook indicator stock studies. Position participates as part of ODFW fishery management team.

1982-1989: Assistant Program Leader, ODFW Marine Resources, Ocean Salmon Management Program, Newport, OR.

Act as assistant OSM program leader. Supervise analysis of ocean salmon statistics for interjurisdiction and domestic fisheries application (PSC, PFMC, KFMC. ODFW technical representative to US/Canada Salmon treaty negotiation and member of CTC (1985-1986). ODFW representative to PFMC Salmon Technical Team (1982-1988).

1982: Marine Resources Consultant

Contracts with ODFW and Alaska Department of Fish and Game.

1974-1980: Area Shellfish Management Biologist, ADFG Westward Region, Kodiak Management District, Kodiak, AK.

Administered, directed, and supervised shellfish management programs and staff for Kodiak management district. Supervised multiple interview/catch sampling and/or tag recovery programs. Conducted management-oriented research, population surveys, and gear studies. Presented oral and written presentations to Alaska Board of Fisheries. Member of ADFG's North Pacific Fishery Management Council's shellfish fishery management planning team.

0.25 FTE (Hours = 520)

Summary of Qualifications

Experience

1986-1989: Staff biologist (FWB-1), Willamette River spring chinook statistical creel programs.

Duties have included:

- 8201300 Coded-Wire Tag Recovery (under 20543)
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**Christine Mallette
Supervising Fish and Wildlife Biologist
Oregon Department of Fish and Wildlife
Fish Identification Section
Clackamas, Oregon**

0.25 FTE (Hours = 520)

Education

M.S.	Zoology	Johann W. von Goethe University, Frankfurt, Germany	1989
B.S.	Biology	Johann W. von Goethe University, Frankfurt, Germany	1984

Summary of Qualifications and Experience

Project leader for Fish Identification Section of ODFW's Fish Division since 1995.

Oregon representative on Pacific States Marine Fisheries Commission's (PSMFC)
Regional Mark Committee

Manage ODFW fish marking program such as Coded Wire Tag (CWT), fin clipping, and experimental marking operations.

Oversee tag processing activities at the central CWT recovery laboratory in Clackamas, Oregon.

J. Kenneth Johnson
Regional Mark Coordinator/Manager
Pacific States Marine Fisheries Commission
Gladstone, OR

Education	Ph.D. Biological Oceanography	Oregon State University, 1980
	M.S. Biological Oceanography	Oregon State University, 1974
	B.S. Zoology	Brigham Young University, 1970

Summary of Qualifications

Advanced training in aquatic sciences. Publications in refereed scientific journals. Management of the regional CWT database at PSMFC since 1979. Experience in system analysis and design, development of data standards and exchange protocols, database implementation and reporting.

Experience

1979-Present Regional Mark Coordinator and Manager. Pacific States Marine Fisheries Commission, Gladstone, OR

Manage the Regional Mark Processing Center (RMPC) which provides essential services to States, Federal, and Tribal fisheries agencies involved in marking anadromous salmonids. These services include regional coordination of tagging and fin marking programs, maintenance of a regional database for Coded-Wire Tag (CWT) releases and recoveries, production of data reports and distribution of CWT data sets. The regional CWT database is accessed through the Regional Mark Information System (RMIS).

Duties include chairing the Regional Mark Committee and serving on various Pacific Salmon Commission committees, including Data Sharing Committee (member), Data Standards Working Group (U.S. Co-Chair), and Catch and Effort Working Group (member).

Relevant Publications

Johnson, J.K. 1990. Regional overview of coded wire tagging of anadromous salmon and steelhead in northwest America. American Fisheries Society Symposium 7:782-816.

Johnson, J.K. and J. Longwill. Annual report: Pacific salmonid coded wire tag releases. (Current report covers most recent past seven years of release data).

Johnson, J.K. and R.N. Thompson. 1989. Status of chinook and coho salmon stock identification efforts for Pacific coastal production areas of the U.S. and Canada. Pacific States Marine Fisheries Commission. 328 pp. Submitted to USFWS, Project AFS-125-1

Section 10. Information/technology transfer

CWT recovery data are made available through the various project reports and technical papers cited in Section 8.d and through PSMFC's Regional Mark Processing Center. The CWT data will be analyzed by federal, state, and tribal agencies, as well as universities and industry. Key entities include both ODFW and WDFW's Ocean Salmon Management Programs, the Columbia River Fisheries Management Program (ODFW/WDFW), the Columbia Basin Tribes (including those represented by CRITFC), IDFG, PFMC, PSMFC, and the Pacific Salmon Commission to determine stock composition in Columbia River sport and commercial fisheries and harvest of Columbia River salmonids in ocean fisheries. The data are also used by Canada and Alaska to monitor the status of Columbia River stocks that are harvested in their marine fisheries.

These data will also be used to determine stock specific exploitation rates. Harvest data will be combined with escapement data to produce annual population estimates for Columbia River salmonid stocks. Based on fishery stock compositions, managers can determine if stock specific harvest rates exceeded preseason expectations or guidelines set forth by the ESA or Columbia River Fish Management Plan.

Congratulations!